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United States Department of Agriculture  
Bureau of Animal Industry  
Animal Husbandry DivisionMINERAL REQUIREMENTS OF ANIMALS

The necessity for the addition of minerals - inorganic salts - to livestock rations is determined by the character of the feed supplied and by an additional demand as the result of functional activity particularly with reference to growth and milk or egg production.

The substances most likely to be deficient in feeds are salt, calcium, and phosphorus; in some cases iodine and iron may be lacking. The need for the addition of other minerals has been recognized but the quantities required have not been adequately demonstrated. Mineral regulators or condiments are not to be classified as mineral foods and should be used only in specific treatments.

A relation should be maintained between calcium and phosphorus which probably should not exceed 2:1 or 1:2. Assimilation of calcium is facilitated by exposure to sunlight or by the ingestion of cod-liver or other potent oils. On page 2, certain feeds are grouped with regard to their mineral content.

Rations consisting largely of the cereal grains are relatively rich in phosphorus and require the addition of calcium-rich supplements such as the legume hays, limestone or a combination of limestone and bone meal. When protein supplements of such rations consist of tankage containing considerable bone, fish meal or milk, the need for mineral supplements is not so great.

Non-leguminous pasturage sometimes may be supplemented by the addition of bone meal, or a mixture of equal parts of limestone, bone meal, and salt. In certain regions the phosphorus content of grass or hay is low. In such cases bone meal or some phosphorus-rich feed is necessary.

When legume hays - alfalfa, clover, soybean hay - are liberally fed little or no mineral addition is required.

Ordinary salt is required by all animals. Iodine is necessary in regions where goiter is prevalent. It is desirable to consult your State experiment station with regard to areas that are likely to be deficient in iodine.

The lactating and pregnant animal, the young animal, and the laying hen all require an adequate supply of calcium.

Good discussions of the mineral needs of animals are contained in bulletins from the following stations:

Wisconsin Agricultural Experiment Station, Madison, Wis.,  
Bulletin 390.

Minnesota Agricultural Experiment Station, University Farm,  
St. Paul, Minn., Special Bulletin 94.

Illinois Agricultural Experiment Station, Urbana, Ill.,  
Circular 411.

### FEEDS CONTAINING CALCIUM

Calcium-rich: Alfalfa, red clover, tankage, milk products, fish meal.

Calcium in moderate amounts: Dried beet pulp, corn silage, corn fodder.

Calcium-poor: Cereal grains (corn, wheat, oats, barley, rye), cereal grain by-products, roots, legume seeds, grass, hay, timothy, and nearly all wild and tame grass hays, cereal straws.

Calcium on border line: Bluegrass, millet, linseed meal, cottonseed meal.

### FEEDS CONTAINING PHOSPHORUS

Phosphorus-rich: Wheat bran, wheat middlings, wheat germ, red-dog flour, legume seeds (soybeans, cow peas), cottonseed meal, linseed meal, milk products, tankage, fish meal, rice polish.

Phosphorus in moderate amounts: Cereal grains (corn, wheat, oats, rye, barley), alfalfa hay, corn stover, corn silage, sweet-clover hay, vetch hay, rape hay.

Phosphorus-poor: Hominy, polished rice, beet pulp, corn cobs, red-clover hay, timothy hay, millet hay, cottonseed hulls, oat hulls, cereal straws.

### MINERALS

Calcium-rich: Limestone, bone meal, spent bone black, bone ash, wood ashes, oyster shell (poultry), di-calcium phosphate. (Rock phosphate, containing fluorine, is not advised.)

Calcium and phosphorus-rich: Bone meal, spent bone black, bone ash, di-calcium phosphate.

Note to accompany the following table on "Mineral Content of Some Feeds."

These data are taken from Tables 1-3, pp. 225-227, inclusive, Ohio Agricultural Experiment Station Bulletin No. 255, (January, 1913) "Mineral and Organic Analyses of Foods". A few other products, principally human foods, are listed in the Ohio publication. For practical comparisons, it should be borne in mind that the values are based on dry matter, rather than on the feeds in their usual form. Accordingly, dry and succulent feeds have been grouped together. The dry feeds are comparable, since the moisture contents are similar. Exact comparisons may be made by using data which indicate the dry matter content of the various feeds. (100 percent minus the moisture percentage.)

Mineral Content of Some Feeds

(Dry weight - see note on preceding page)

Feeds	Calcium Percent	Phosphorus Percent	Potassium Percent	Magnesium Percent	Sodium Percent	Sulphur Percent
<b>Cereal products:</b>						
Corn	.014	.303	.396	.126	.030	.171
Corn bran	.030	.156	.410	.088	.000	.124
Distiller's grain (corn)	.047	.314	.014	.054	.154	.509
Distiller's grain (rye)	.142	.458	.045	.195	.077	.408
Brewer's grain	.169	.503	.185	.172	.278	.419
Gluten feed	.268	.589	.272	.239	.461	.636
Kafir corn	.013	.271	.288	.142	.066	.186
Malt sprouts	.159	.746	.219	.194	1.458	.864
Oats	.112	.434	.460	.130	.184	.214
Rice polish	.030	1.684	1.279	.741	.124	.189
Red dog flour	.134	.928	.425	.324	.733	.285
Wheat	.056	.425	.590	.142	.035	.224
Wheat bran	.139	1.233	1.464	.590	.223	.297
Wheat germ	.078	1.147	.323	.372	.788	.355
Wheat middlings	.108	.984	1.147	.430	.186	.263
<b>Roughage:</b>						
Alfalfa hay	1.130	.238	.832	.400	.489	.298
Bluegrass	.336	.242	1.405	.240	.141	.334
Corn stover	.507	.102	1.847	.092	.035	.187
Cowpea hay	2.029	.283	.873	1.096	.722	.352
Millet hay	.326	.173	1.338	.262	.099	.159
Red clover hay	1.236	.183	1.840	.292	.067	.190
Soybean hay	1.378	.237	1.774	.692	.145	.259
Timothy hay	.192	.123	.613	.111	.345	.162
Wheat straw	.217	.038	.842	.063	.237	.159
<b>Fruit, vegetables, etc.:</b>						
Apples	.027	.064	.802	.033	.066	.044
Beet pulp	.729	.069	.347	.283	.185	.138
Cabbage	.590	.262	2.484	.209	.028	.901
Mangel wurzels	.131	.260	3.870	.358	.714	.224
Potatoes, sweet	.084	.186	1.203	.215	.061	.117
Potatoes, white	.027	.270	1.547	.331	.175	.141
<b>Legume seeds and other protein concentrates:</b>						
Cowpeas	.117	.532	1.636	.243	.189	.280
Cottonseed meal	.291	1.479	1.811	.599	.283	.536
Linseed meal	.403	.786	1.224	.544	.282	.455
Milk, skim	1.336	.979	1.272	.146	.488	.357
Navy beans	.235	.429	1.390	.206	.086	.224
Peanuts	.068	.399	.061	.180	.563	.254
Soybeans	.230	.649	2.095	.244	.380	.444
Tankage	3.242	1.789	.601	.159	1.830	.669
Whey	.721	.640	2.762	.138	.459	.139

